REMARKS

Reconsideration of this application is respectfully requested.

In the Office Action, the Examiner noted that claims 1-8 are pending in the application and that claims 1-8 are rejected. Upon entry of the foregoing amendments, claims 1-11 are pending in the application with claim 1 being the only independent claim. Claims 2, 3, and 8 are cancelled. Claims 1 and 7 are sought to be amended. New claims 9, 10, and 11 are sought to be added. Figures 1-3 and 8 are sought to be amended. These changes are believed to add no new matter, and their entry is respectfully requested.

Based on the above amendments and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Oath/Declaration

The original Declaration stands objected to under 37 C.F.R § 1.67(a) as being defective for missing an execution date associated with inventor Richard Cusick. A Supplemental Declaration signed and dated by Richard Cusick, filed herewith, obviates this objection.

Drawing Objections

The drawings stand objected to under 37 C.F.R. § 1.83(a) for allegedly failing to provide illustrations of the features recited in claims 3, 4 and 6-8. Figures 1-3, 7 and 8 are sought to be amended to obviate the objections under 37 C.F.R. § 1.83(a) and to clarify the claimed invention. It is believed that all of the drawing/Figure amendments are fully supported by the present application and add no new matter. The Examiner's approval of the amended Figures is respectfully requested.

Objections to the Figures relating to claim 3

Claim 3 is canceled, thereby obviating the drawing objection related thereto.

Objections to the Figures relating to claim 4

Claim 4 recites that the sensors of the present invention are capable of transmitting electromagnetic energy. The features of claim 4 are illustrated in the drawings as originally filed and as amended.

Support for claim 4 is found in the present application at paragraph 16, which states:

> The sensors of the present invention can include . . . sensors such as *radar or LIDAR transceivers*.

Thus, the sensors depicted in Figures 1, 2, 3 and 8 may be radar or LIDAR transceivers. By definition, a "transceiver" is "a module composed of a *radio* receiver and *transmitter*." Webster's II New College Dictionary 1170 (1st ed. 1995). Thus, a radar/LIDAR transceiver sensor transmits and receives electromagnetic (i.e., radio/optical) energy, as is recited in claim 4. As is well known to one having ordinary skill in the relevant art(s), a *transceiver* sensor transmits and receives electromagnetic energy within its field of view, which may be defined by a receive/transmit antenna pattern, for example. Such fields of view are depicted in at least Figures 1, 2, 3 and 8 of the present application. Therefore, the features recited in claim 4 are depicted in the Figures of the present application.

Objections to the Figures relating to claim 5

Claim 5 recites that the plurality of sensors comprise fiber optic light sensors. Applicant respectfully submits that the features of claim 5 are illustrated in the drawings as amended and as originally filed.

In the present application, paragraphs 16 recites:

> The sensors of the present invention can include *simple optical sensors* such as those described in the example below . . . .

Additionally, paragraph 30 recites:

> . . . that the *light is collected at each sensor position by a fiber optic bundle* with a nominal outside diameter . . . .

The collection of light by a "fiber optic bundle" is inherently the reception of energy by fiber optic light sensors. Because the sensors depicted in Figures 1, 2, 3 and 8 may be fiber optic bundles or fiber optic sensors in accordance with paragraph 30, the features of claim 5 are depicted in the Figures.

Objections to the Figures relating to claim 6

Claim 6 as originally filed includes the feature of detecting an "impact of projectiles." In fact, the sensor array of the present invention detects an "intense flash of light" called a "hit flash plume" caused by such an impact. That is, the detected hit flash plume indicates the impact of projectiles, and thus represents a detected "impact of projectiles." See the present application, paragraph 19.

Claim 6 is amended to delete the feature of an "impact of projectiles," thereby obviating the drawing objection thereto. Instead, amended claim 6 recites the feature of detecting "a hit flash plume." Support for the claimed "hit flash plume" is found in the present application at paragraph 19 and 28, for example. Paragraph 28 recites, with reference to Figure 7:

> The effect of the size of the *hit flash plume* may be determined by Fig. 7. In this figure, the box ABDC gives the area of the plume, with the plume width AB and plume height AD.

Thus, Figure 7 provides an illustration of a portion of the plume, i.e., plume area ABCD.

Figure 3 is amended to include a "plume" resulting from an impact of a projectile on the surface of the cylinder of Figure 3. Support for adding the "plume" to Figure 3 is found in the present application at paragraph 8, which recites with reference to Figure 3:

> The length of the sensor's [X] planar field of view [XAB] at distance *l*, *AB*, is a function of *a hit flash plume, p*.

The plume height *p*, depicted in original Figure 3, is an inherent feature of the "plume" added to Figure 3.

Objections to the Figures relating to claims 7 and 8

In Figure 8, the "Front view" represents sensors, depicted as small round dots, arranged around an arcuate portion of a circumference of a cylindrical object. In the "Top view" of Figure 8, three of the sensors from the "Front view" are depicted as elongated rectangular boxes. The "Front view" and "Top view" of Figure 8 are amended to label the "round dots" and "rectangular boxes" as "sensors."

To obviate the drawing objection to claim 7, the "Top view" of Figure 8 is further amended to illustrate an overlap of narrow and wide fields of view. Specifically, in the "Top view" of Figure 8, the angular lines defining adjacent narrow and wide fields of view are now extended as dashed lines to the right-side of Figure 8 such that the extended narrow and wide fields of view overlap one another.

Claim 8 is cancelled and the features recited therein incorporated into amended claim 1. Specifically, amended claim 1 recites in part:

> a cylindrical object having a curved surface;
> a plurality of sensors arranged around a circumference of the cylindrical object, ...

It is believed that the "Front view" of Figure 8 as originally filed provides an illustration of the features recited above and in claim 8 as originally filed. However, Figure 3 is also amended in a manner described below to provide an illustration of the above recited features.

Figures 1 and 2 are amended to include sensors, depicted as elongated rectangular boxes similar to those depicted in the "Top View" of Figure 8, identified by appropriate reference numerals (e.g. A-F, G and X). Support for these drawing amendments is provided at paragraphs 6, 7, 8, and 14. For example, paragraph 14 recites:

> Fig. 1 illustrates an embodiment of the present invention comprising linear array of seven evenly spaced *sensors labeled A-G*. In Fig. 1, each sensor points to the right of the page and has a limited field of view that is defined by *two angular lines that originate at the sensor.*

Figure 3 is a perspective view of a cylinder or cylindrical object carrying the sensors of the present invention. To obviate the drawing objection relating to the features recited in claim 8 as originally filed and now incorporated into amended claim 1, Figure 3 is amended to include the sensors of Figure 1 arranged or wrapped around a circumference of the cylinder. Support for this amendment is found in the present application at paragraph 21, which states:

> The hit detector array according to the present example *requires wrapping a linear array such as that shown in Fig. 1 around a cylinder to create a circular sensor array.*

Further support for adding the sensors to Figure 3 is found in paragraph 25, which recites with reference to Figure 3:

> The half-angles are then used to determine *the number of sensors (m)* that need to be uniformly *distributed around the circumference of the missile motor* . . . .

Claim Objections

Amended claim 6 obviates the objection thereto listed in enumerated paragraph 3 of the Office Action.

Prior Art Rejections

Applicant respectfully traverses all of the claim rejections under 35 U.S.C. § 102(b) and 103(a) listed at enumerated paragraphs 4-10 of the Office Action.

Claims 2-3 and 8 are canceled, thereby obviating their respective rejections.

Claim 1

Claim 1 is amended to include the inventive features of claim 8 and additional inventive features. Amended claim 1 recites in part:

> A sensor array system for detecting the position of an object or energy source, comprising:
>
> a cylindrical object having a curved surface;
>
> a plurality of sensors arranged around a circumference of the cylindrical object, each having a limited field of view ~~and being~~ that
>
> (i) extends along a length of the curved surface, and
>
> (ii) is capable of detecting an object or energy source that is positioned within its field of view, . . . and
>
> a data acquisition system, . . . , thereby determining the unique spatial region, along the curved surface of the cylindrical object, in which the object or energy source is located.

Depicted in Figures 3 and 8 (the "Front view") are examples of the claimed "cylindrical object having a curved surface" and "a plurality of sensors [e.g., A-F, and X] arranged around a circumference of the cylindrical object." Also depicted in Figure 3 is an example of the claimed "field of view [e.g., field of view XAB] that extends along a length of the curved surface.

The applied references, U.S. Patent 5,196,689 issued to *Sugita et al.* (the '689 patent) and U.S. Patent 2,442,690 issued to *Hoffman et al.* (the '690 patent), taken either alone or in combination, fail to disclose or suggest the invention recited in amended claim 1.

The Examiner rejected original claim 8 (the features of which have been incorporated into amended claim1) under 35 U.S.C. 103(a) as being unpatentable over Hoffman in view of Sugita. In support of this rejection, the Examiner alleges it would have been obvious to provide "sensors around the circumference of a cylindrical object in the apparatus of Hoffman in view of Sugita to enclose the detection area." Applicant disagrees for at least the following reasons.

Hoffman discloses a *rectangular* shaped framework 15 having *planar* sides that carry sensors for viewing an area *inside/within* the framework. See Hoffman, Figure 2. Hoffman does *not* disclose or suggest a "*cylindrical object*" and "a plurality of sensors around *a circumference of the cylindrical object*," as recited in original claim 8 (now canceled) and amended claim 1.

Sugita discloses a plurality of sensors L_A-L_E arranged circumferentially around a portion of a viewing area that is *devoid* of any objects. Thus, Sugita fails to disclose or suggest the claimed "*cylindrical object.*" The sensors in Sugita have respective fields-of-view directed *radially inward* toward each other and thus overlapping in the viewing area that is *devoid* of objects. Assume for argument sake that the sensors L_A-L_E were arranged around the circumference of a cylindrical object, as suggested by the Examiner. In such an arrangement, the *radially inward* directed fields-of-view in Sugita would be obstructed by the cylindrical object. Such obstruction would prevent the required overlap of the fields-of-view, and thus render the Examiner's suggested arrangement inoperable. Thus, Sugita teaches away from such an arrangement. The system disclosed in Hoffman does nothing to cure such an obstruction, because it also includes interiorly-directed fields-of-view. Therefore, Sugita and Hoffman, taken either alone or in combination, fail to disclose or suggest the features recited in claim 1.

Amended claim 1 also recites that each field-of-view "extends along a length of the curved surface" of the cylindrical object. An example of this arrangement can be seen in Figure 3 of the present application. This arrangement advantageously permits detection of an energy source such as an impact plume within the field-of-view along the surface of the cylindrical object. Neither Hoffman nor Sugita, taken alone or in combination, disclose or suggest this feature.

For at least the reasons advanced above, amended claim 1 is believed patentable over the applied references. All of the claims depending from claim 1 are patentable for at least the reasons claim 1 is patentable.

New Claims 9, 10 and 11

All of the new claims include inventive features neither disclosed nor suggested by the applied references taken alone or in combination.

Support for new claim 9 can be found in the present application in Figure 3, 7 and 8. New claim 9 recites the feature of a field-of-view extending along the curved surface of the cylindrical object in a direction *perpendicular to* a radius of curvature thereof. See e.g., Figure

3. In contrast, Sugita discloses fields-of-view directed *along* (not perpendicular to) the radius of curvature.

Support for claim new 10 can be found in the present application at paragraphs 18, 19, 20 and 25.

Support for claim 11 can be found in the present application at paragraph 23.

CONCLUSION

On the basis of the above amendments and remarks, reconsideration and allowance of this application is believed warranted. If the Examiner believes, for any reason, that personal communication will expedite prosecution, the Examiner is invited to telephone the undersigned at the number provided.

Respectfully Submitted,

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Date 9/16/03

Enclosures: Replacement Sheets for Figures 1-3 and 8
Annotated Sheets Showing Changes to Figure 1-3 and 8.